

**In the Claims**

Please cancel claims 36 and 37, add new claims 38, 39 and new claim 40 (corresponding to previously-presented claim 4), and amend the claims as indicated below. This listing of claims replaces all prior versions.

- Amended*
1. (currently amended) A method of identifying crosstalk in a received signal, the method comprising:
    - collecting received data corresponding to the received signal from a receiver;
    - collecting primary data from a primary transmitter;
    - collecting crosstalk data from a crosstalk transmitter; and
    - at a location remote from the receiver, identifying a crosstalk functioncorresponding to the crosstalk data.
  2. (currently amended) ~~The~~ A method of claim 1 further identifying crosstalk in a received signal, the method comprising:
    - collecting received data corresponding to the received signal from a receiver;
    - collecting primary data from a primary transmitter;
    - collecting crosstalk data from a crosstalk transmitter;
    - identifying a crosstalk function corresponding to the crosstalk data; and
    - determining a first estimate of a timing offset between the received data and the crosstalk data.
  3. (original) The method of claim 2 wherein determining the first estimate of the timing offset comprises cross-correlating the received data and the crosstalk data if the timing offset is other than zero.
  4. (original) The method of claim 1 wherein identifying the crosstalk function comprises performing an estimation from the group comprising a standard least-squares estimation and a weighted least-squares estimation.
  5. (original) The method of claim 4 wherein performing an estimation includes jointly

determining an estimate of the timing offset between the received data and the crosstalk data and identifying a crosstalk function corresponding to the crosstalk data.

6. (original) The method of claim 1 further comprising:

collecting a plurality of sets of crosstalk data from a plurality of crosstalk transmitters, including a first set of crosstalk data from a first crosstalk transmitter;  
identifying a crosstalk function corresponding to the first set of crosstalk data.

7. (original) The method of claim 6 further comprising determining a first estimate of a timing offset between the received data and the first set of crosstalk data.

8. (currently amended) The method of claim 1 further identifying crosstalk in a received signal, the method comprising:

collecting received data corresponding to the received signal from a receiver;

collecting primary data from a primary transmitter;

collecting crosstalk data from a crosstalk transmitter;

identifying a crosstalk function corresponding to the crosstalk data;

collecting a plurality of sets of crosstalk data from a plurality of crosstalk transmitters, the plurality of sets of crosstalk data comprising a set of strong crosstalk signal data corresponding to a strong crosstalk signal and a set of weak crosstalk signal data corresponding to a weak crosstalk signal;

determining whether a timing offset exists between the received data and the set of strong crosstalk signal data;

generating a first estimate of any determined timing offset between the received data and the set of strong crosstalk signal data;

identifying a strong crosstalk function corresponding to the strong crosstalk signal data;

subtracting the strong crosstalk function from the received signal to generate a modified received signal;

determining whether a timing offset exists between the received data and the set of weak crosstalk signal data;

generating a first estimate of any determined timing offset between the modified received signal and the weak crosstalk signal data; and

identifying a weak crosstalk function corresponding to the weak crosstalk signal data.

9. (currently amended) ~~The~~A method of ~~claim 2~~ further identifying crosstalk in a received signal, the method comprising:

collecting received data corresponding to the received signal from a receiver;

collecting primary data from a primary transmitter;

collecting crosstalk data from a crosstalk transmitter;

subtracting the primary data from the received data prior to determining ~~the~~ a first estimate of the timing offset between the received data and the crosstalk data;

determining a first estimate of a timing offset between the received data and the crosstalk data; and

identifying a crosstalk function corresponding to the crosstalk data.

10. (currently amended) ~~The~~A method of ~~claim 1~~ further identifying crosstalk in a received signal, the method comprising:

collecting received data corresponding to the received signal from a receiver;

collecting primary data from a primary transmitter;

collecting crosstalk data from a crosstalk transmitter;

identifying a crosstalk function corresponding to the crosstalk data; and

performing multiuser detection using the identified crosstalk function.

11. (original) The method of claim 1 further comprising provisioning communication lines in a DSL system in which the identified crosstalk function is identified.

12. (original) The method of claim 1 further comprising performing DSL system diagnosis services for a DSL system in which the identified crosstalk function is identified.

13. (original) The method of claim 1 further comprising providing DSL system maintenance services for a DSL system in which the identified crosstalk function is identified.

14. (original) The method of claim 1 further comprising performing spectral management services for a DSL system in which the identified crosstalk function is identified.

15. (currently amended) A system for identifying crosstalk comprising:

a first transmitter configured to transmit a first signal;

a second transmitter configured to transmit a second signal;

a receiver configured to receive a combined signal, the combined signal comprising the first signal and crosstalk interference from the second signal; and

a processor, at a location remote from the receiver, comprising:

a data collector in communication with the first transmitter, the second transmitter and the receiver, the collector configured to collect:

a first signal data set corresponding to the first signal;

a second signal data set corresponding to the second signal; and

a combined signal data set corresponding to the combined signal;

a crosstalk identifier connected to the data collector comprising:

a crosstalk response estimator configured to estimate the crosstalk interference present in the combined signal.

16. (original) The system of claim 15 wherein the crosstalk identifier further comprises a first timing offset estimator configured to calculate a first estimate of a timing offset between the combined signal and the second signal.

17. (currently amended) ~~The~~ A system of claim 16 wherein the for identifying crosstalk comprising:

a first transmitter configured to transmit a first signal;

a second transmitter configured to transmit a second signal;

a receiver configured to receive a combined signal, the combined signal comprising the first signal and crosstalk interference from the second signal; and  
a processor comprising:  
a data collector in communication with the first transmitter, the second transmitter and the receiver, the collector configured to collect:  
a first signal data set corresponding to the first signal;  
a second signal data set corresponding to the second signal; and  
a combined signal data set corresponding to the combined signal;  
a crosstalk identifier connected to the data collector comprising:  
a first timing offset estimator configured to calculate a first estimate of a timing offset between the combined signal and the second signal; and  
a crosstalk response estimator configured to estimate the crosstalk interference present in the combined signal and also is configured to calculate a second estimate of the timing offset.

18. (currently amended) The system of claim 16 wherein the first timing offset estimator comprises a cross-correlator configured to perform a cross-correlation of the combined signal and the second signal to provide the first estimate of the timing offset.

19. (original) The system of claim 15 wherein the crosstalk identifier comprises a least-squares estimator.

20. (original) The system of claim 15 wherein the first transmitter and the receiver are part of a DSL communication system.

21. (currently amended) The system of claim ~~[[15]]~~17 wherein the processor is located at a location remote from the first and second transmitters and the receiver.

22. (original) The system of claim 15 wherein the first transmitter, the second transmitter and the receiver are modems.

23. (currently amended) ~~The~~ A system of claim 15 wherein the for identifying crosstalk comprising:

a first transmitter configured to transmit a first signal;

a second transmitter configured to transmit a second signal;

a receiver configured to receive a combined signal, the combined signal comprising the first signal and crosstalk interference from the second signal; and

a processor comprising:

a data collector in communication with the first transmitter, the second transmitter and the receiver, the collector configured to collect:

a first signal data set corresponding to the first signal;

a second signal data set corresponding to the second signal; and

a combined signal data set corresponding to the combined signal;

a crosstalk identifier connected to the data collector comprising:

a crosstalk response estimator configured to estimate the crosstalk interference present in the combined signal; and

further comprises a data conditioner, connected to the data collector, configured to resample collected data.

24. (currently amended) ~~The~~ A system of claim 15 wherein the for identifying crosstalk comprising:

a first transmitter configured to transmit a first signal;

a second transmitter configured to transmit a second signal;

a receiver configured to receive a combined signal, the combined signal comprising the first signal and crosstalk interference from the second signal; and

a processor comprising:

a data collector in communication with the first transmitter, the second transmitter and the receiver, the collector configured to collect:

a first signal data set corresponding to the first signal;

a second signal data set corresponding to the second signal; and

a combined signal data set corresponding to the combined signal;

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a crosstalk identifier connected to the data collector comprising:  
a crosstalk response estimator configured to estimate the crosstalk  
interference present in the combined signal; and  
further comprises a data subtractor configured to subtract the first  
signal from the combined signal to generate an interference signal.

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25. (currently amended) For use in a communication system including at least one  
receiver at a first location and communication control equipment at a second location that  
is remote from the first location, [[A]] a crosstalk identifier comprising:

a collector co-located with and communicatively coupled with the communication  
control equipment and configured to collect data from a primary signal transmitter, from  
a crosstalk signal transmitter and from [[a]] the receiver; and

a crosstalk estimator in communication with the collector, the crosstalk estimator  
configured to determine a first estimate of a crosstalk response in the data from the  
receiver, and wherein the crosstalk interference is a function of the timing offset and the  
data collected from the primary signal transmitter.

26. (currently amended) The A crosstalk identifier of claim 25 further comprising:

a collector configured to collect data from a primary signal transmitter, from a  
crosstalk signal transmitter and from a receiver;

a crosstalk estimator in communication with the collector, the crosstalk estimator  
configured to determine a first estimate of a crosstalk response in the data from the  
receiver; and

a timing estimator connected to the collector, the timing estimator configured to  
determine a first estimate of a timing offset between the data from the receiver and the  
data from the crosstalk signal transmitter.

27. (currently amended) The A crosstalk identifier of claim 26 wherein the comprising:

a collector configured to collect data from a primary signal transmitter, from a  
crosstalk signal transmitter and from a receiver;

a crosstalk estimator in communication with the collector, the crosstalk estimator configured to determine a first estimate of a crosstalk response in the data from the receiver and further also is configured to determine a second estimate of the timing offset between the data from the receiver and the data from the crosstalk signal transmitter; and  
a timing estimator connected to the collector, the timing estimator configured to determine a first estimate of a timing offset between the data from the receiver and the data from the crosstalk signal transmitter.

28. (original) The identifier of claim 26 wherein the timing estimator comprises a cross-correlator configured to provide a cross-correlation of the data from the receiver and the data from the crosstalk signal transmitter to determine the first estimate of the timing offset.

29. (original) The identifier of claim 25 wherein the crosstalk estimator comprises a least-squares estimator configured to determine the first estimate of the crosstalk response.

30. (original) The identifier of claim 27 wherein the crosstalk estimator uses a least-squares estimator to determine a second estimate of the timing offset.

31. (currently amended) ~~The~~ A crosstalk identifier of claim 25 comprising:  
a collector configured to collect data from a primary signal transmitter, from a crosstalk signal transmitter and from a receiver; and  
a crosstalk estimator in communication with the collector, the crosstalk estimator configured to determine a first estimate of a crosstalk response in the data from the receiver, and wherein the identifier is configured to be used at a third party site remote from the transmitters and the receiver.

32. (original) A method for identifying crosstalk in a received signal caused by interference from a crosstalk signal, the method comprising:  
collecting received data from a receiver that has received the received signal during a specified time period;



collecting primary data transmitted as a primary signal during the specified time period;

collecting crosstalk data transmitted as a first crosstalk signal during the specified time period;

subtracting the primary data from the received data to generate interference data;

determining a first estimate of a timing offset between the received signal and the first crosstalk signal, comprising cross-correlating the interference data and the crosstalk data;

identifying a crosstalk function corresponding to the crosstalk signal, comprising performing a least-squares estimation to identify the crosstalk function and the crosstalk signal using the interference data and the first estimate of the timing offset.

33. (currently amended) A method of dynamically managing spectra in a DSL system, the method comprising:

identifying crosstalk functions and characteristics in the DSL system as a function of a differential between known transmitted data and a combined signal, the combined signal including the known transmitted data and crosstalk noise;

transferring information concerning the identified crosstalk functions; and

controlling, as a function of the transferred information, line spectra in modems in the DSL system.

34. (currently amended) The method of claim 33 wherein identifying crosstalk functions and characteristics in the DSL system includes determining an interference signal as a function of the differential and identifying a crosstalk function based on the known transmitted data and the interference signal, and wherein the step of controlling line spectra in modems in the DSL system comprises: includes adjusting spectra in the DSL system to reduce crosstalk interference[[:]].

35. (original) The method of claim 33 wherein the step of identifying crosstalk functions and characteristics in the DSL system includes the step of identifying crosstalk in a received signal, identifying crosstalk in a received signal comprising: collecting received

data corresponding to the received signal from a receiver; collecting primary data from a primary transmitter; collecting crosstalk data from a crosstalk transmitter; identifying a crosstalk function corresponding to the crosstalk data.

36. (canceled)

37. (canceled)

38. (new) A method for identifying crosstalk, comprising:

determining an interference signal as a function of a differential between known transmitted data and a combined signal, the combined signal including the first signal and crosstalk noise; and

identifying a crosstalk function based on the known transmitted data and the interference signal.

39. (new) A communication system having terminals that transmit data and terminals that receive data over communication channels that are subject to crosstalk, the system comprising:

means for determining an interference signal as a function of a differential between known transmitted data and a combined signal, the combined signal including the first signal and crosstalk noise; and

means for identifying a crosstalk function based on the known transmitted data and the interference signal.

40. (new) A method of identifying crosstalk in a received signal, the method comprising:

collecting received data corresponding to the received signal from a receiver;

collecting primary data from a primary transmitter;

collecting crosstalk data from a crosstalk transmitter; and

identifying a crosstalk function corresponding to the crosstalk data, including performing an estimation from the group comprising a standard least-squares estimation and a weighted least-squares estimation.